



Climate and environmental coastal risks in the Mediterranean

by **MedEC** 

Mediterranean Experts on Climate
and environmental Change



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Mediterranean
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MEDITERRANEAN EXPERTS ON CLIMATE AND ENVIRONMENTAL CHANGE

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Special Report

Climate and Environmental Coastal Risks in the Mediterranean

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and environmental Change



Union for the Mediterranean
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Foreword

Climate change, natural disasters, and environmental degradation linked to pollution have multiple direct and indirect impacts on the coastal ecosystems and the health and well-being of coastal populations along the Mediterranean basin. This special report identifies the drivers of change in the coastal areas and their interactions. The findings indicate that the Mediterranean coastal areas are vulnerable to flooding and erosion, seawater intrusion, general degradation of coastal habitats, invasion of non-indigenous species, coastal squeeze, water shortage and cumulative pollution attributed to agricultural, urban and industrial practices.

Coastal communities will bear the immediate impact of coastal resource degradation. They will suffer most from rising sea level as well as severe weather events such as storm surges and tsunamis. The special report addresses the hazards posed by the drivers and their interactions as well as their observed impact and the future risks on the natural, socioeconomic and human systems. It indicates that community and resource resiliency depend mainly on the preparedness of communities and the adaptation measures in place, in addition to the vulnerability of the exposed entities, the frequency of exposure to consecutive events and the extent of damages. The special report presents and discusses particular strategies used in the Mediterranean Coast to manage climatic and environmental risks. It highlights the need for mitigation measures to reduce the probability of resource degradation, and adaptation measures to reduce the losses and damages resulting from resource degradation. It also identifies barriers to effective responses in the Mediterranean region.

The attainment of climate resilient sustainable development pathways in the coastal areas of the Mediterranean remains a serious challenge. Risks are expected to increase in the near future based on the projected climate change scenarios and the environmental changes linked to urban and coastal population growth whose distributional effects have an important policy dimension. Policy development, regional cooperation and proper communication to support greater integration of knowledge are fundamental to achieve sustainable coastal zone management practices.

This special report implicitly expresses our desire that coastal risks in the Mediterranean be addressed in such a way that the Mediterranean coast becomes a paradigm of peace, good coexistence and respect for life, cultures and the environment. This and other initiatives are examples of how scientific cooperation between different communities, countries and disciplines can be productive and very powerful for addressing environmental issues and is beneficial for all countries.

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Piero LIONELLO,
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Statements from key partners



The Mediterranean world is at the heart of adaptation to climate change. This is not an abstraction, nor a figment of the imagination. The torrential rains that ravaged the city of Valencia in Spain, killing more than two hundred people, are a reminder of the reality of a highly exposed basin. Mare Nostrum is exposed to the effect of the movement of the European and African tectonic plates and the fact that the air, and above all the water, is warming up faster than the rest of the planet. The risk here is multiplied tenfold by the high concentration of population on the coasts. The interaction between the hazard and issues at stake means that coastal risks are now considered to be a major civil protection issue.

This work will feed not only into the academic work of the Plan Bleu, but also into the revision of the new Mediterranean Strategy for Sustainable Development (MSSD 2026-2035), so that all the States can mobilize around genuine South/North cooperation. For that, we need new financial tools and means without them proposals raised will stay pious hopes. Thank you to the MedECC for this report, which sounds like a trumpet from Jericho.

Mr Robin Degron
Director of Plan Bleu/RAC



The Mediterranean coastal zones represent a crucial interface between land and sea, where environmental, social, and economic dynamics intersect. These areas are facing increasing pressures from climate change, pollution, urbanisation, and unsustainable exploitation of resources. The need for scientific understanding of coastal risks and collaborative action have never been greater.

This Special Report, prepared by the Mediterranean Experts on Climate and environmental Change (MedECC), plays a vital role in shedding light on the vulnerabilities and risks that coastal zones face in the Mediterranean. It builds upon the foundational work of the Barcelona Convention, a framework that has guided regional cooperation for nearly five decades in protecting the Mediterranean's marine and coastal environments. This report intends to ensure that decision-makers are equipped with science-based insights that can drive effective, coordinated responses.

The importance of this report extends beyond environmental protection; it touches on the very sustainability and resilience of the communities that depend on healthy coastal ecosystems. By integrating this knowledge into policies, the Mediterranean can better prepare for the impacts of climate change, ensure the protection of its coastal biodiversity, and foster sustainable development, towards effective SDGs implementation at regional scale. As we move forward, the findings of this report will serve as a valuable tool for governments, stakeholders, and citizens alike. It is only through collaborative regional efforts and evidence-based policymaking that we can safeguard the future of the Mediterranean's coastal zones.

Ms Tatjana Hema
*UN Environment Programme/
Mediterranean Action Plan (UNEP/
MAP) Coordinator*



As we stand at a critical crossroad facing escalating environmental and climate catastrophes, this new report on Mediterranean coastal risks comes as an immediate call for action on our collective responsibility. The Mediterranean region is not only a cornerstone region where cultures, economies and ecosystems converge but also a vital hub for millions of people who depend on its coastlines for their livelihoods, heritage and shared prosperity. With temperatures rising well above the Paris Agreement's 1.5°C threshold, the window of opportunity for action is rapidly closing. The projected sea-level rise and acceleration of extreme weather events threaten our communities, and economies. With its unwavering support for the MedECC and the backing of this report, the Union for the Mediterranean calls for a unified, urgent and ambitious regional response. Political leaders must step up and address both the present and future challenges with a collaborative approach to implement effective adaptation and mitigation strategies. The urgency of the climate crisis we face demands immediate steps which are critical to safeguard our shared Mediterranean future. We must transform the Mediterranean from a "hot spot" to a hope spot". This can only be achieved together, by increasing regional cooperation, investing in sustainable practices and prioritizing the resilience of our communities. The findings presented in the report call for all stakeholders to engage in rapid transformative measures. We need to act now, choosing cooperation over division and sustainability over short term goals. We must rise up to the challenge and protect our coastlines, support our vulnerable communities, and safeguard the Mediterranean cultural heritage and biodiversity.

Mr Nasser Kamel
*Secretary General of the Union for the
Mediterranean (UfM)*

Preface

MedECC

The **Mediterranean Experts on Climate and environmental Change (MedECC)** is an open and independent international network of scientists founded in 2015, that specifically focuses on climate and environmental changes within the Mediterranean region. The objective of MedECC is to provide decision-makers, stakeholders, and citizens with assessments of available scientific knowledge on climate and environmental changes including associated risks and social aspects. MedECC reports aim to maintain neutrality regarding policy and to objectively address scientific, technical and socio-economic factors relevant to the application of policies. They are produced for use by policymakers and a broader audience, developed on the basis of scientific criteria only.

Since its creation, more than 300 authors have contributed to MedECC reports, all in an individual capacity and without financial compensation. MedECC scientists are located in 35 countries, including 19 registered as Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and 23 members of the Union for the Mediterranean (UfM).

The network is governed by Co-Coordinator, a Steering Committee, and an Advisory Board. Operations are managed by the MedECC Secretariat, which is officially hosted by Plan Bleu, a UNEP/MAP Regional Activity Centre in Marseille, France, as part of a partnership with the Secretariat of the Union for the Mediterranean (UfM). The Mediterranean Action Plan of the United Nations Environment Program (UNEP/MAP) has also provided support since 2022, with MedECC activities integrated into the UNEP/MAP Work Programmes for 2022-2023 and 2024-2025, approved during COP 22 (Antalya, Türkiye, December 2021) and COP 23 (Portorož, December 2023).

MedECC published the ***First Mediterranean Assessment Report (MAR1): Climate and Environmental Change in the Mediterranean Basin – Current situation and risks for the future***, in November 2020. It includes a Summary for Policymakers (SPM) that has been approved line-by-line during a plenary session attended by government representatives from Mediterranean countries in September 2020, ensuring its relevance to stakeholders. MedECC was awarded the prestigious North-South Prize 2020 of the Council of Europe for its efforts towards peace and democracy. The SPM was recognised as an important contribution of the scientific community to future climate and environmental action in the Mediterranean region in the Declaration adopted during the 2nd Ministerial Meeting on Climate and Environmental Action of the Union for the Mediterranean (4 October 2021, Cairo, Egypt), and Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Protocols at their 22nd meeting (COP 22, December 2021, Antalya, Türkiye). The findings of MAR1 have since been widely acknowledged and cited in strategic documents, establishing it as a foundational scientific source for climate and mitigation policies across the Mediterranean.

The MAR1 report has laid significant groundwork for other major contributions in the Mediterranean. MedECC contributed to the coordination of the climate change chapter in the State of the Environment and Development in the Mediterranean (SoED) report, published in 2020. MedECC authors contributed to the IPCC sixth assessment report (AR6-WG2) published in February 2022, contributing a cross-chapter paper specifically focused on the Mediterranean Basin, integrating regional aspects into the global assessment.

The Portorož Ministerial Declaration, signed by the Ministers of the Environment and Heads of Delegation of the Contracting Parties to the Barcelona Convention during COP 23 (5-8 December 2023, Portorož, Slovenia) emphasises the need to enhance actions against climate change in the Mediterranean and to protect marine ecosystems from its harmful impacts. It calls for a strengthening of scientific knowledge and expertise in this area, highlighting initiatives like MedECC (Decision UNEP/MED IG.26).

This Special Report

The Special Report *Climate and Environmental Coastal Risks in the Mediterranean* responds to the MedECC Steering Committee's decision to provide scientific information to specific issues for the Mediterranean identified after the publication of MAR1, informed by both scientists and government representatives. It provides an assessment of the scientific, technical and socio-economic literature on environmental and climate change risks in the Mediterranean Basin's coastal zones. It builds upon the MedECC MAR1 report, previous reports by the Intergovernmental Panel on Climate Change (IPCC), and other relevant regional, national, and local assessments, and is drawing on evidence from over 1000 scientific publications.

Scope of the Report

A third of the Mediterranean population (around 150 million people) lives close to the sea and depends on coastal resources for its survival and livelihood. The coastal zone of the Mediterranean Sea is affected by multiple drivers of change: climate, pollution, biologic and socio-economic processes. This report describes their evolution, their impacts on ecosystems and people, the risks that are posed and solutions to reduce them, together with pathways for sustainable development. Adaptation actions are presented, placing social and cultural values in the context of the region and its local traditions. The report considers the need to protect communities, minimise impacts on the natural environment, and address ethical considerations important for socially oriented adaptation policies.

The available knowledge concerning the risks studied by MedECC contains significant gaps, often due to limited monitoring systems and scientific research capacity — these gaps have been communicated as clearly as possible. The best efforts have been made to provide complete and correct information, in spite of the gaps and uncertainty caused by the evolving nature of the knowledge, the limited monitoring systems and scientific research capacity, which have been communicated as clearly as possible.

Structure of the Report

The report consists of five Chapters, with additional annexes. It includes a Summary for Policymakers that is composed of headline statements and narrative of the key messages of the longer report and provides an executive summary of the report.

The introduction (*Chapter 1*) provides the context, background and key dimensions of this assessment. *Chapter 2* assesses the main drivers of climate change and environmental coastal risks in the Mediterranean and their changes. *Chapter 3* assesses the impacts of these drivers, and the risks posed on both interconnected human and natural systems. *Chapter 4* assesses the existing and prospective responses and management approaches to address these risks. The final chapter (*Chapter 5*) synthesises the available knowledge about climate-resilient and sustainable development pathways, building on the outcomes of *Chapters 2* to *4*. This structure aims to propose a coherent assessment of the risks and responses for ecosystems, water, food, cities, human health, and livelihoods, efficiently to guide policymakers and stakeholders toward resilient and sustainable futures.

The Process

The Special Report represents the collaborative efforts of a team of leading experts and scientists who volunteered their time and expertise without financial compensation. Its preparation followed the established principles of scientific assessments, similar to those applied for MAR1 and the IPCC, involving an open and rigorous process of author selection, external peer-review, and stakeholder consultation. An open call for self-nominations of scientific experts was circulated in April 2021. The Scoping Meeting, held in July 2021, brought together experts, scientists, government representatives, and other stakeholders to identify key topics, chapters, and major questions that the report should address. The initial draft outline was reviewed and approved by the MedECC Steering Committee. Authors were also selected and approved by the MedECC Steering Committee.

based on their expertise, their country and the gender, resulting in a task force of 56 authors from 17 countries. The detailed content of the report was further refined during in-person meeting in Spain in June 2022, held jointly with the authors of two other MedECC Special Reports¹, and through a consultation with stakeholders, including members of the UfM Climate Change Expert Group (CCEG), UNEP/MAP and Plan Bleu focal points, and members of the Mediterranean Commission on Sustainable Development (MCSD).

The development of the Special Reports involved several stages of drafting, an open and transparent review and revision process, and consultation with stakeholders to ensure scientific accuracy and robustness, as well as strong policy-relevance. The initial draft (Zero Order Draft) underwent internal review in December 2022, receiving 479 comments from 15 reviewers. The First Order Draft report and its Summary for Policymakers (SPM) underwent extensive peer review and stakeholder consultation between May and July 2023. In total, 820 comments on the full report and 247 comments on the SPM were submitted by 50 reviewers. Authors revised the chapter drafts, addressing every comment thoroughly, and the SPM was concluded during an online plenary consultation with key stakeholders on November 7, 2024. These included MAP Focal Points, Plan Bleu Focal Points, members of the Mediterranean Commission on Sustainable Development (MCSD), MAP Partners, as well as members, observers, and partners of the UfM Climate Change Expert Group (UfM CCEG) and the UfM Working Group on Environment and Climate Change (WG ENV-CC), among other MedECC partners.

The Summary for Policymakers of the Special Report was approved by the Contracting Parties of the Barcelona Convention during their 23rd Meeting (Decision IG.26/13, COP 23, Slovenia, 5-8 December 2023).

¹ MedECC Special Report *Interlinking climate change with the Water - Energy - Food - Ecosystems (WEFE) nexus in the Mediterranean Basin*, 2024: <https://www.medecc.org/medecc-reports/climate-wefe-nexus> and MedECC Expert analysis on the nexus between environmental change, conflict, and human migration (in finalisation stage).



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